# AbstractID: 10302 Title: Dosimetric verification of ultra small fields of image-guided linac-based stereotactic radiosurgery

**Purpose:** To investigate mechanical and dosimetric accuracy of ultra small fields of a cone beam CT (CBCT)-based stereotactic radiosurgery (SRS) system. **Method and Materials:** Ultra small fields (7.5 mm, 10 mm, and 12.5 mm cones) of an Elekta linac-based SRS system were assessed using CBCT-based setup and film dosimetry. To examine mechanical accuracy of the linac for SRS, a technique of image analysis was developed using flex maps acquired with a phantom holding a CT-compatible sphere target at the center. The accuracy of CBCT-based SRS setup was evaluated with sophisticatedly designed geometrical structures of the phantom in sub-millimeter precision. For dosimetric verification, another cylindrical acrylic phantom with film inserts was developed. The film phantom has marker structures for setup verification. Radiochromic film was inserted into the phantom and 4 SRS plans of 100º arc beams using three SRS cones were delivered. Dose difference distributions and profiles between computations (Philips Pinnacle$^3$) and the film measurements were qualitatively compared. For quantitative analysis, the computations and the measurements were generated in a resolution of 0.25 mm/pixel and a gamma test with 3%/1mm (dose difference/distance-to-agreement (DTA)) criteria was performed. **Results:** The spherical target in the flex maps (portal images of 0.5 mm/pixel) and image-guided sphere phantom setup showed the mechanical uncertainty of the SRS system is less than 1 mm. The geometrical marker structures in the film phantom were employed to set up the phantom with sub-millimeter accuracy using CBCT. The gamma test showed that the dose delivery matched the dose calculation within 3% dose difference or 1mm DTA. **Conclusion:** The comprehensive quality assurance tools using CBCT-based SRS setup and radiochromic film dosimetry allowed us to achieve maximum 1 mm of mechanical uncertainty and 3% of dosimetric uncertainty of ultra small fields in our linac-based SRS system.